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NOTES ON SOME DISEASES OF ECONOMIC CROPS IN THE ARKANSAS RIVER VALLEY, COLORADO, 1929.

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The Arkansas River valley extends as a narrow belt across the southeastern part of Colorado, from the Kansas line to the foot of the Rocky Mountains at Canon City, a distance of about 175 miles. The region is chiefly a broad, eastward-sloping plain, which rises from an elevation of 3,400 feet above sea level at Holly in the eastern end of the valley to 5,333 feet at the foot of the mountains.

Numerous drainage systems have been successfully installed in many acres of this valley which have reclaimed the land so it now produces a large number of crops. This valley in 1928 produced $21,186,164 or approximately 20 per cent of all the crop wealth of the state of Colorado.

DISEASES OF FIELD CROPS

WHEAT

Stem rust (Puccinia graminis). As reported in Plant Disease Reporter 13: 69 the conditions were such that stem rust did not develop on wheat until very late and the fields matured before any appreciable damage resulted.

Leaf rust (Puccinia triticina). Very abundant this spring, but did not cause much damage.

Stinking smut (Tilletia laevis). Very little was found in the winter wheat in this part of the state. The use of copper carbonate is quite widespread here for the treating of the seed.

OATS

Stem rust (Puccinia graminis). Most of the plants were affected. The average severity of infection was approximately 10 to 60 per cent. Not much loss resulted due to the late appearance of rust. Some notes regarding stem rust and the condition of maturity of plants were made on two nurseries of oats varieties. These data were taken on June 23 and are compiled in the table following. The fields are designated as I and II and were within five miles of each other.

Table 1. Stem rust of oats in two fields, June 23.

Variety	Average infection of plants		Maturity of plants
	I	II	
Markton	85-90 per cent	85-90 per cent	Well matured
Kanota	No rust	65-70 " "	Some stalks green
Nebraska 21	" "	50-60 " "	Well matured
Burt	Trace	5-8 " "	Ripe and stalks dry
Bliss Side	No rust	Trace	Immature, stalks green
Colorado 37	Trace	5-10 " "	" " "
Texas Red	"	" " " "	Mature, stalks dry

Smut (Ustilago avenae). Only an occasional affected plant was found. Less than one per cent infection.

BARLEY

Stem rust (Puccinia graminis). Barley was practically all harvested before stem rust became abundant.

Stripe (Helminthosporium gramineum). Abundant in every field examined. About 10 to 20 per cent of lower leaves were affected which later turned brown and dried up.

Smuts (Ustilago hordei and U. nuda). Very common. One field showed between 20 and 30 per cent infection. Treatment for smuts of barley has not become a standard practice in this section.

CORN

Smut (Ustilago zeae). Only a moderate amount was present in corn in the Arkansas River valley. Field counts in about 30 fields showed less than one per cent infection.

DISEASES OF VEGETABLE CROPS

BEAN

Bacterial blight (Bacterium phaseoli). Found in the majority of bean fields and about 25 per cent of the foliage was affected, turning it yellow to brown and finally drying it up completely. This disease appeared very rapidly immediately following a ten-day rain period in the middle of August.

Rust (Uromyces appendiculatus). First appeared about August 20, following a rainy period. It was very abundant in the majority of fields. Many fields were examined in which every leaf of all plants was affected in varying degrees of severity. Generally leaves that were affected with bacterial blight (Bacterium phaseoli) had only a few or no pustules of rust.

Root rot (Fusarium martii phaseoli). Quite scattered, but a severe infection was found in one field near Rocky Ford. In that instance the land had been in beans last season and the crop had been destroyed by root rot. This spring pinto beans were planted and the crop was plowed under late in May due to infection of root rot. A second crop this season was planted in June and this too was almost a total loss due to Fusarium martii phaseoli. Root rot was found in almost every field, but was causing very little damage except in the one field just mentioned.

TOMATO

Wilt (Fusarium lycopersici). Most abundant in the area around Pueblo. In this section many fields had as high as 30 to 40 per cent of the plants affected with wilt. Only an occasional outbreak was found near Rocky Ford.

Early blight (Alternaria solani). Practically every tomato field had early blight, but it did not cause any appreciable losses. Only a few spots were present on the leaves and the number of affected leaves was small on any one plant.

CELERY

Yellows (Fusarium sp.) Particularly abundant in the celery fields around Canon City. In this district as much as 40 to 50 per cent of the plants in a few fields were found to be affected. The disease was most abundant in a variety sold as Golden Self Blanching. More disease was found on dry than on wet soil. In the Pueblo and Rocky Ford districts only an occasional plant affected with this disease could be found.

CAULIFLOWER

Black rot (Bacterium campestre). Caused a loss of 25 per cent and 35 per cent respectively in two fields near Pueblo. Most of the fields had much less loss, the average for the entire crop being about four per cent.

Leaf spot (Bacterium maculicolum). Abundant in most fields. Infection was as low as five per cent in some fields, but the majority of fields showed between 75 and 80 per cent infection. The disease was usually limited to the lower leaves and was seldom found on the upper leaves.

PEPPER

Wilt (Fusarium annuum). Very abundant in pepper fields near Pueblo. Began after the fruit had set. A field of Ruby King had about 40 to 50 per cent dead plants and a field of California Wonder was about 70 to 80 per cent loss. The loss for the 500 acres of peppers in this area was about 20 to 25 per cent.

EGGPLANT

Wilt (Verticillium alboatrum). Only five or ten acres of eggplant were grown near Canon City this season. About 20 to 25 per cent of the plants were affected with wilt. The affected plants all had a dark brown discoloration running up the woody tissue and in a few instances it extended to the fruit. Wilting did not generally occur until the plants had reached a height of 16 to 18 inches. Some plants were stunted, more had wilted suddenly after setting fruit.

MELONS

Blight (Macrosporium cucumerinum). Affected cantaloupes, watermelons, honeydew melons, and cucumbers. On each of these hosts it eventually destroyed all of the foliage before harvest. In the case of honeydews the fruit was left exposed after the foliage fell to the ground and sunscald followed. In several fields examined nearly every honeydew melon had a brown area on the surface exposed to the afternoon sun. Cucumbers appeared to be less severely attacked by this disease.

Anthracnose (Colletotrichum lagenarium). A few honeydew melon fields were found to be affected with anthracnose. In one field about 40 to 50 per cent of the melons were affected. The average infection for the fields examined was approximately 10 per cent.

SUGAR BEETS

Leaf spot (Cercospora beticola). Appeared first near Lamar about June 22, and near Rocky Ford on July 5. The disease was not severe up to August 2, but after ten days of rain following this date a severe epidemic resulted. One field had 85 to 90 per cent infection and about 10 per cent of the leaves had dried up by August 28, which gave the fields a distinct brown appearance. This disease was present in every field and fields that showed drying were not uncommon. Many sugar beet growers are dusting now with copper-lime dust for the control of leaf spot.

Leaf spot (Phoma betae). Present in some fields, but not very abundant and as a leaf spot caused very little damage.

Root rots (Corticium vagum, Phoma betae, and Fusarium sp.) Many fields were affected with root rots, the infection varying from one per cent to thirty or forty per cent. Corticium vagum caused about three-fourths of the rots while Phoma betae and Fusarium sp. were generally of minor importance. Decreases in stands were quite common during the seedling stage where these fungi probably caused a damping off.

ONION

Purple blotch (Macrosporium porri). This disease was limited in its severe form to a small area around Rocky Ford. This fact is interesting since onions have been grown around Rocky Ford the longest and much of the land has produced several successive onion crops. A very good example of the relation of rotation to the presence of purple blotch was found on a farm near the city limits of Rocky Ford. Part of the field had been in onions the year before and the other part in sugar beets. The diseased onion tops had not been raked up the previous fall after harvest. The land that had been in onions a year ago showed about 65 to 70 per cent infection of purple blotch this year while the part that was in sugar beets only showed about 10 per cent. It was estimated that some of the most badly infected fields had the yield reduced about 10,000 pounds per acre. In the worst fields as high as 95 per cent of the plants were affected while in others the prevalence was as low as 20 to 30 per cent. Several fields with a few affected plants were found at La Junta, eleven miles east of Rocky Ford, and at Fort Lyon which is about 40 miles east of Rocky Ford.

Pink root (Fusarium malli or Phoma terrestria). This disease had only been found in the Littleton section up to June, 1929. During this summer it was found in scattered places in several localities of the Arkansas River valley. It was found at Canon City and Rocky Ford and at Garden City, Kansas. At Canon City several fields of transplanted Texas onions were heavily infested with pink root. Every plant pulled showed practically every root to be affected. At Rocky Ford several fields of onions grown from seed were affected with this disease. It was thought that the fungus is being spread by the high winds blowing the soil that had become infested by growing diseased Bermuda plants for the past ten years or more. Several million plants are shipped in from Texas to Garden City, Kansas, each year. All of the plants that were received this year were examined this summer and every field was badly infected with pink root.

Bulb rot (Fusarium sp.) A few plants showing bulb rot were found in two fields near Rocky Ford. No serious losses, however, resulted from this disease.

DISEASES OF FORAGE CROPS

ALFALFA

Bacterial wilt (Aplanobacter insidiosum). This disease continues to be the most destructive in alfalfa. It was scattered in distribution and found in many fields. One field was visited in which about 75 to 80 per cent of the plants were affected and had begun to wilt early in June. In a two-year old

field about one to two per cent infection was present where no disease was observed last season. Serious losses in stand occurred especially in fields more than three years old.

Downy mildew (Peronospora trifoliorum). The first crop was the only one affected. The disease seldom causes much damage and this was true this summer.

Leaf spot (Pseudopeziza medicaginis). Particularly abundant on the third cutting of alfalfa. On this cutting practically every lower leaf was affected with an abundance of lesions. No appreciable loss resulted.

RED CLOVER

Powdery mildew (Erysiphe polygoni). Attacked both cuttings of red clover and was widely distributed. Lower leaves were practically covered with conidia, but no wilting or dying occurred on either cutting.

Failure to set seed. In most years the red clover has produced two seed crops, but the first crop this year only produced seed in a few fields somewhat distant from towns. The failure to set seed this year was attributed to the lack of pollinating insects according to Mr. E. A. Hollowell of the U. S. Department of Agriculture. Aphids were particularly abundant on the early crop and many of the farmers attributed this condition to their presence. These insects were found as abundant, however, on fields that produced good yields of seeds as they were on fields producing a low yield.

DISEASES OF FRUITS

GOOSEBERRIES

Winter injury. Gooseberry bushes produced an abnormal growth in the tops this spring which gave them the appearance of being affected with a witches' broom disease. This malformation was limited to the old canes and was thought to be due to winter injury. The fruit of the old canes was small and fell prematurely. The leaves were likewise small and the canes became defoliated soon after the fruit had fallen.

STRAWBERRIES

Yellows (undet.) About three to four per cent of the plants were affected and were dying or had already died by June 13. The berries on diseased plants were small, hard and unsalable. The disease appeared to be most destructive in two-year old fields.

Root rot (undet.) Very common in practically every field of strawberries examined. Infection ranged from less than one per cent in some fields (mostly one-year old) to five to ten per cent in older fields.

DISEASES OF ORNAMENTALS

ZINNIA

Grown commercially in this section for seed, there being 300 to 400 acres planted this season.

Powdery mildew (Erysiphe cichoracearum). Very abundant in every field from Canon City, Colorado to Garden City, Kansas. It is most abundant on the lower leaves which were often completely covered with the mycelium of the fungus. Sulfur dust is being used successfully to control this disease.

Wilt (Fusarium sp.) Present in a majority of fields. The disease causes the plants to wilt, particularly when young, but many plants were not affected until near flowering. Diseased plants dry up, but generally remain erect. Losses ranged from one to five per cent in most fields, but some fields had as high as ten to fifteen per cent of affected plants.

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